

Peach Summer School 2007 Extended Abstract:

Smoking Cessation for Teens through Video Games Usage

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Abstract – An Internet-based Virtual Reality game that helps adolescents quit smoking was developed by the Virtual Reality Medical Center (VRMC). Cue-exposure therapy is used in this interactive program to treat addictive behaviors resulting from smoking. Various triggers (ashtrays, packs of cigarettes, coffee, beer and peer pressure) that cause a smoker to continue smoking are identified by the program, which also provides teens with distracting activities to avoid such triggers (e.g., exercising, playing games, cooking, taking naps, and calling a friend). Overall, VRMC's teen smoking prevention program functions in such a way as to educate teen's about how to avoid the situations at the root of cravings, in order to prevent potential smoking relapses.

Keywords – Virtual Reality (VR), Cue-exposure therapy, smoking cessation, craving triggers, video games.

I. MOTIVATION

Cigarette smoking accounts for one in five deaths (440,000 people) each year, which is 1,200 deaths per day, and continues to be the leading preventable cause of premature death in the United States year after year¹. According to results from the 2005 National Survey on Drug Use and Health, an estimated 4,000 people aged 12 to 17 begin smoking every day in the United States. Approximately 1,140 young people become daily smokers². Moreover, the younger the smokers are when the habit forms, the more addicted they become to nicotine³. To further aggravate the situation, most smoking cessation programs are targeted towards adults, not teens⁴.

II. VIRTUAL ENVIRONMENT (VE) OVERVIEW

Home and school are the two major regions that make up the VRMC Teen Smoking VE. Two floors comprise the home environment, with the bottom floor consisting of the garage and the top floor containing a bedroom, kitchen, bathroom, and living room.



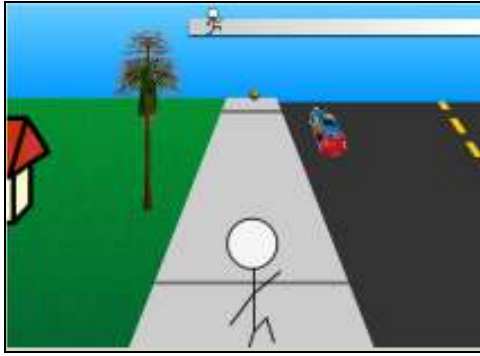
PEACH SS ABSTRACT Figure 1 – VE of Bedroom

Selecting a quit date is an important first step for quitting smoking, according to many smoking cessation strategies. Therefore, the program begins in the user's bedroom, where he/she must determine and select their goal quit date in order to proceed into the program and participate in the activities.



PEACH SS ABSTRACT Figure 2 – VE of Kitchen

The lungs icon in the bottom left corner of the screen indicates the health of the user's lungs, dependent on how much or little the user has smoked. The less the user smokes, the pinker the lungs become. Once a user smokes a cigarette, the lungs begin to darken. The lung icon correlates with the stamina bar below it. If the user smokes and the lungs darken, the user will need to restore his/her lungs back to a healthy condition. To do this, the player may enter the bedroom and select the treadmill under the bed, illustrating the need for healthy exercise.



PEACH SS ABSTRACT Figure 3 – VE Exercise

When a player smokes, and the lungs darken, the stamina level of the player decreases. In addition, the stamina level, although starting off full, will decrease as the day progresses, and will be impacted by such things as exercise. In order to boost the user's stamina level, he/she must either take a nap or eat. The player may proceed to the kitchen to assemble a sandwich with ingredients provided in the refrigerator.



PEACH SS ABSTRACT Figure 4 – VE Sandwich

Craving triggers are presented throughout the game to test the user's ability to navigate around these temptations and enable the cessation of smoking. The level of the user's craving is monitored by the craving status bar at the top right corner of the screen. In accordance with another common smoking cessation strategy, the player will be prompted to throw away all smoking related paraphernalia in order to decrease the temptation. When faced with smoking related objects, such as a pack of cigarettes, the player will be prompted to either "smoke," "ignore," or "throw away" these objects.

The second region of the VE is the school grounds. The school grounds consist of a classroom, the cafeteria and the bathroom. In these areas, the user must interact with fellow students.



PEACH SS ABSTRACT Figure 5 – VE of Classroom

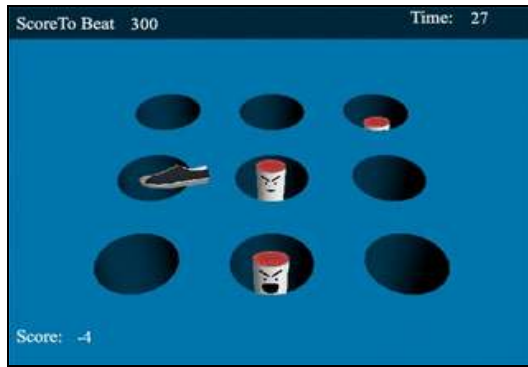


PEACH SS ABSTRACT Figure 6 – VE of school cafeteria



PEACH SS ABSTRACT Figure 7 – Peer pressure and craving trigger

One major trigger occurs in the school environment, where the user is exposed to peer pressure. If a user chooses not to smoke, he/she is then presented with a randomly selected game. Should the user win the game, then he/she has successfully denied the craving; however, if the user loses, the user has then given into the craving and smokes.



PEACH SS ABSTRACT Figure 8 - VE Randomly Selected Game



PEACH SS ABSTRACT Figure 9 – VE Randomly Selected Game

Smoking resets the smoke-free-day counter located at the top of the screen. The lungs icon will darken and the stamina indicator will decrease, illustrating the repercussions of smoking. The definitive objective of the program is for the user to remain smoke-free in both environments for as long as possible.

III. METHODOLOGY

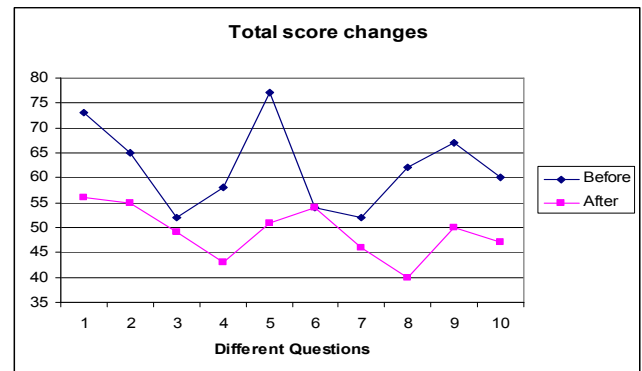
A research study was performed with 15 participants with full regulatory approval. The study sessions lasted 15 minutes each. Non Parametric tests were used to establish data for this study, such as the Signed Rank test and the Wilcoxon Signed rank test. The Teen Smoking Pre/Post Test Questionnaire was administered to the participants in order to assess adolescent's knowledge relating to the cessation of smoking. Participants were requested to answer questions based on a scale of 1 to 10. Subjects who completely agreed with a statement answered with a rating of 1. Scores from 2-9 indicated an answer of either somewhat agreeing or disagreeing. An answer of 10 meant complete disagreement.

The Presence and Realism Questionnaire was administered in conjunction with the Teen Smoking Pre/Post Test Questionnaire in order to assess the degree of realism that was experienced by the participants. The Questionnaire

asked subjects to rate the degree of realism encountered in the game. Ratings of "Not at all," "Extremely artificial," "Not involved" or "Not consistent" were rated as a 1. A rating of 4 implied "Borderline" or "Somewhat" realistic. Meanwhile, "Completely natural" scored a 7.

IV. RESULTS

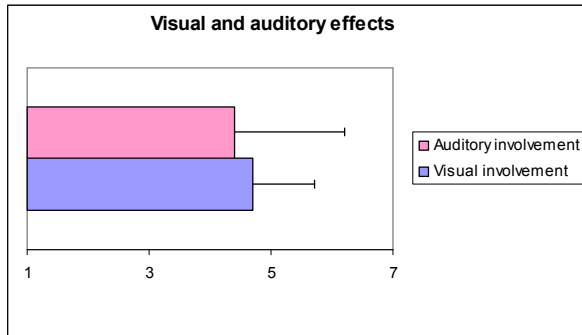
The data from the Pre/Post Test Questionnaire and the Presence and Realism Questionnaire were reviewed and analyzed. In regards to the Pre/Post Test Questionnaire, it was found that the Pre Test Questionnaire scores were on average, higher than the Post Test Questionnaire scores, showing that the participants received educational knowledge on smoking cessation from the VRMC's program.



PEACH SS ABSTRACT Table 1 – Results of Teen Smoking Pre/Post Test Questionnaire

In regards to the Presence and Realism Questionnaire, participants with a higher score had a greater feeling of presence. This was evaluated by the rated scores. The participants with no feelings of presence scored a zero, a 2-50% feeling of presence scored one, 50-75% scored two, and 65-100% scored 3. The higher the score, the more realistic the participant felt the VE was.

If the subjects experienced both a high level of auditory and visual involvement with the VE along with a feeling that the VE was consistent with their natural environment, it was found that they performed better on the questionnaires, and therefore, were the most influenced by the VE.



PEACH SS ABSTRACT Table 2 – Auditory and Visual Involvement of Subjects

Overall, the results indicate that healthier habits developed in participants after game play.

V. CONCLUSIONS

In an effort to stop teen smoking, VRMC has successfully created an internet based virtual interactive environment. The research indicates that the program helps adolescents gain knowledge and understanding about cessation techniques. Those that participated in the program agreed that setting a quit date, keeping busy and performing physical activities aid with distraction from smoking which results in the cessation of smoking. The subjects also agreed that the virtual setting is a natural environment with realistic visual and auditory effects. There were no instances of side effects.

V. FUTURE COLLABORATIONS & ENHANCEMENTS

The Virtual Reality Medical Center and its affiliate in Brussels, The Virtual Reality Medical Institute, have commenced conversations with European partners who are committed to bringing the Teen Smoking Cessation project to their countries. An agreement to deliver the software to military dependents worldwide via the Internet has also been established by VRMC.

Some future enhancements include multiplayer capability, customization, and coordination of an online “common,” such as a forum or message board which can act as an informative resource for the community. By enabling these functionalities, users can collaboratively bolster resolve to cease smoking and increase concrete realistic attributes to further immersion. The addition of a virtual store can serve to reinforce quitting behavior through the use of virtual monetary rewards which can be applied to purchasing furniture and other items. Once the enhanced version of this program is launched, VRMC envisions coordinating informational presentations and events at schools and various institutions to promote smoke-free lifestyles while employing the game as a conduit. Further, a major

incentive can involve real-life prizes used as rewards during competitions between users playing the game.

The purpose of this program is to provide a safe environment for users to interact and develop support for their quitting efforts.

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